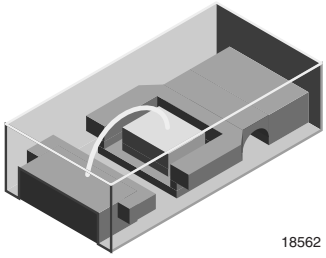
Standard 0603 SMD LED



DESCRIPTION

The new 0603 LED series have been designed in the smallest SMD package. This innovative 0603 LED technology opens the way to

- smaller products of higher performance
- more design in flexibility
- enhanced applications

The 0603 LED is an obvious solution for small-scale, high power products that are expected to work reliability in an arduous environment.

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD 0603
- Product series: standard
- Angle of half intensity: ± 80°

FEATURES

- Smallest SMD package 0603 with exceptional brightness
  1.6 mm x 0.8 mm x 0.6 mm (L x W x H)
- High reliability lead frame based
- Temperature range -40 °C to +100 °C
- Footprint compatible to 0603 chipled
- Wavelength 466 nm (blue), 570 nm (green), 561 nm (pure green), 589 nm (yellow), 606 nm (orange), 633 nm (red)
- AlInGaP and GaN technology
- Viewing angle: extremely wide 160°
- Grouping parameter: luminous intensity, wavelength
- Available in 8 mm tape
- Compatible to IR reflow soldering
- Preconditioning according to JEDEC® level 2
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Backlight keypads
- Navigation systems
- Cellular phone displays
- Displays for industrial control systems
- Automotive features
- Miniaturized color effects
- Traffic displays

PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at I_F (mA)	WAVELENGTH (nm)			at I_F (mA)	FORWARD VOLTAGE (V)			at I_F (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
TLMS1100-GS08	Red	32	63	-	20	627	633	639	20	-	2.1	3.0	20	AlInGaP
TLMO1100-GS08	Orange	50	80	-	20	600	606	609	20	-	2.1	3.0	20	AlInGaP
TLMY1100-GS08	Yellow	50	80	-	20	580	589	595	20	-	2.1	3.0	20	AlInGaP
TLMG1100-GS08	Green	12.5	35	-	20	564	570	575	20	-	2.1	3.0	20	AlInGaP
TLMP1100-GS08	Pure green	6.3	15	-	20	551	561	566	20	-	2.1	3.0	20	AlInGaP
TLMB1100-GS08	Blue	4	5	-	10	-	466	-	10	-	3.9	4.5	10	GaN

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ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)
TLMS1100, TLMO1100, TLMY1100, TLMG1100, TLMP1100

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage (1)		V_R	12	V
DC forward current	$T_{amb} \leq 75$ °C	I_F	30	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	0.5	A
Power dissipation		P_V	90	mW
Junction temperature		T_j	+120	°C
Operating temperature range		T_{amb}	-40 to +100	°C
Storage temperature range		T_{stg}	-40 to +100	°C
Soldering temperature	acc. Vischay specification	T_{sd}	+260	°C
Thermal resistance junction/ambient	mounted on PC board (pad size > 5 mm²)	R_{thJA}	480	K/W

Note
(1) Driving the LED in reverse direction is suitable for short term application

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)
TLMB1100

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage (1)		V_R	5	V
DC forward current	$T_{amb} \leq 60$ °C	I_F	15	mA
Surge forward current	$t_p \leq 10$ µs	I_{FSM}	0.1	A
Power dissipation		P_V	68	mW
Junction temperature		T_j	+100	°C
Operating temperature range		T_{amb}	-40 to +100	°C
Storage temperature range		T_{stg}	-40 to +100	°C
Soldering temperature	acc. Vischay specification	T_{sd}	+260	°C
Thermal resistance junction/ambient	mounted on PC board (pad size > 5 mm²)	R_{thJA}	480	K/W

Note
(1) Driving the LED in reverse direction is suitable for short term application

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLMS1100, RED

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	I_V	32	63	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	627	633	639	nm
Peak wavelength	I_F = 20 mA	λ_p	-	645	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	deg
Forward voltage	I_F = 20 mA	V_F	-	2.1	3.0	V
Reverse voltage	I_R = 10 µA	V_R	6	-	-	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLMO1100, ORANGE

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	I_V	50	80	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	600	606	609	nm
Peak wavelength	I_F = 20 mA	λ_p	-	610	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	deg
Forward voltage	I_F = 20 mA	V_F	-	2.1	3.0	V
Reverse voltage	I_R = 10 µA	V_R	6	-	-	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

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OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLMY1100, YELLOW

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	I_V	50	80	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	580	589	595	nm
Peak wavelength	I_F = 20 mA	λ_p	-	591	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	deg
Forward voltage	I_F = 20 mA	V_F	-	2.1	3.0	V
Reverse voltage	I_R = 10 µA	V_R	6	-	-	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLMG1100, GREEN

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	I_V	12.5	35	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	564	570	575	nm
Peak wavelength	I_F = 20 mA	λ_p	-	572	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	deg
Forward voltage	I_F = 20 mA	V_F	-	2.1	3.0	V
Reverse voltage	I_R = 10 µA	V_R	6	-	-	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLMP1100, PURE GREEN

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 20 mA	I_V	6.3	15	-	mcd
Dominant wavelength	I_F = 20 mA	λ_d	551	561	566	nm
Peak wavelength	I_F = 20 mA	λ_p	-	562	-	nm
Angle of half intensity	I_F = 20 mA	φ	-	± 80	-	deg
Forward voltage	I_F = 20 mA	V_F	-	2.1	3.0	V
Reverse voltage	I_R = 10 µA	V_R	6	-	-	V
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	15	-	pF

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)
TLMB1100, BLUE

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	I_F = 10 mA	I_V	4	5	-	mcd
Dominant wavelength	I_F = 10 mA	λ_d	-	466	-	nm
Peak wavelength	I_F = 10 mA	λ_p	-	428	-	nm
Angle of half intensity	I_F = 10 mA	φ	-	± 80	-	deg
Forward voltage	I_F = 10 mA	V_F	-	3.9	4.5	V
Reverse voltage	I_R = 10 µA	V_R	5	-	-	V

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LUMINOUS INTENSITY/FLUX CLASSIFICATION

GROUP	LUMINOUS INTENSITY I_V (mcd)	
	MIN.	MAX.
Pa	4	6.3
Pb	5	8
Qa	6.3	10
Qb	8	12.5
Ra	10	16
Rb	12.5	20
Sa	16	25
Sb	20	32
Ta	25	40
Tb	32	50
Ua	40	63
Ub	50	80
Va	63	100
Vb	80	125
Wa	100	160
Wb	125	200

Note

- Luminous intensity is tested at a current pulse duration of 25 ms.
  The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped on each reel (there will be no mixing of two groups on each reel).
  In order to ensure availability, single brightness groups will not be orderable.
  In a similar manner for colors where wavelength groups are measured and binned, single wavelength groups will be shipped in any one reel.
  In order to ensure availability, single wavelength groups will not be orderable.

COLOR CLASSIFICATION

GROUP	DOM. WAVELENGTH (nm)									
	BLUE		PURE GREEN		GREEN		YELLOW		ORANGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
- 1	-	-	551	554	564	566	-	-	-	-
- 2	460	464	554	557	566	569	580	583	600	603
- 3	464	468	557	560	569	572	583	586	603	606
- 4	468	472	560	563	572	575	586	589	606	609
- 5	472	476	563	566	-	-	589	592	609	612
- 6	-	-	-	-	-	-	592	595	-	-

Note

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm.

GROUP NAME ON LABEL

LUMINOUS INTENSITY GROUP	HALFGROUP	WAVELENGTH
Q	b	4

Note

- One packing unit/tape contains only one classification group of luminous intensity, color and forward voltage.
  Only one single classification groups is not available.
  The given groups are not order codes, customer specific group combinations require marketing agreement.
  No color subgrouping for super red.

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TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

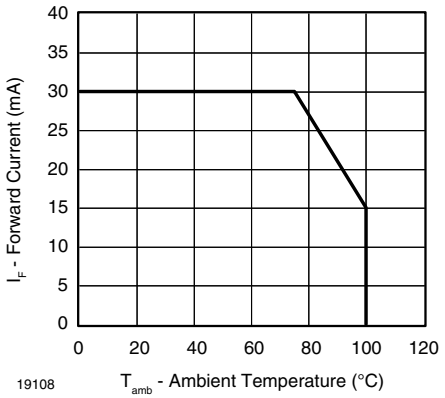


Fig. 1 - Forward Current vs. Ambient Temperature

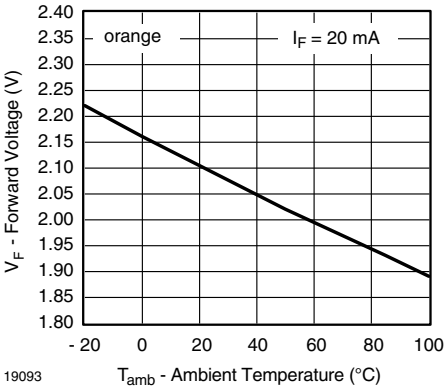


Fig. 4 - Forward Voltage vs. Ambient Temperature

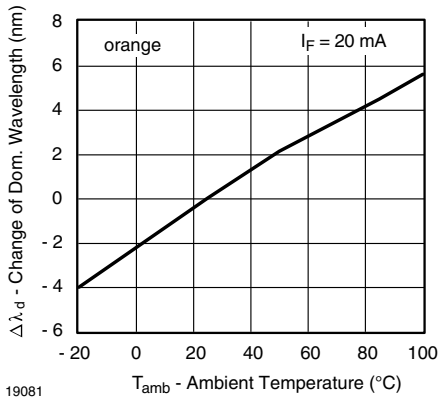


Fig. 2 - Change of Dominant Wavelength vs. Ambient Temperature

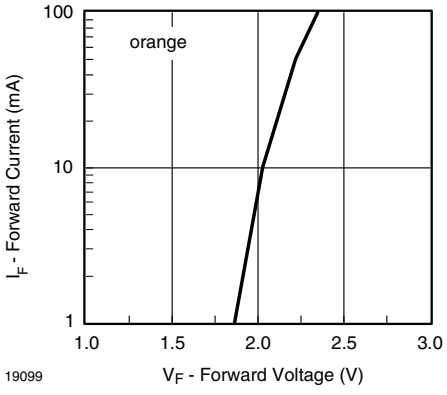


Fig. 5 - Forward Current vs. Forward Voltage

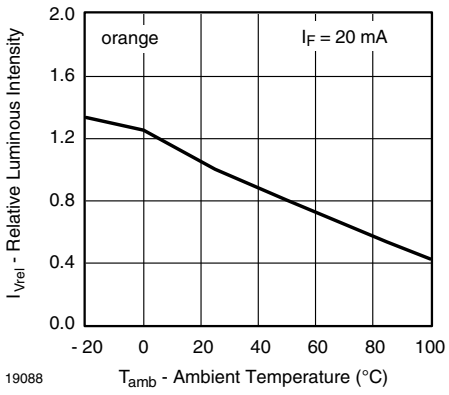


Fig. 3 - Relative Luminous Intensity vs. Ambient Temperature

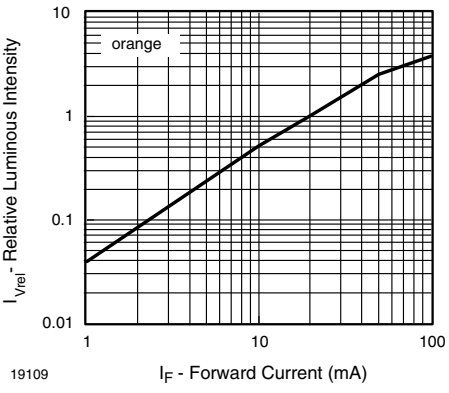


Fig. 6 - Relative Luminous Intensity vs. Forward Current

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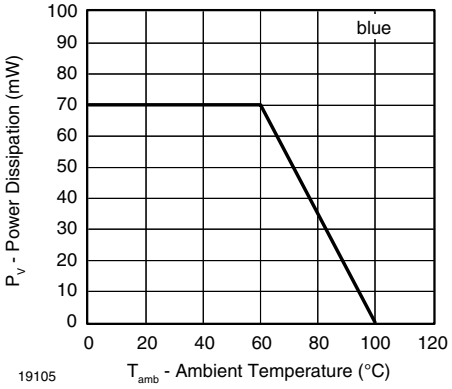


Fig. 7 - Power Dissipation vs. Ambient Temperature

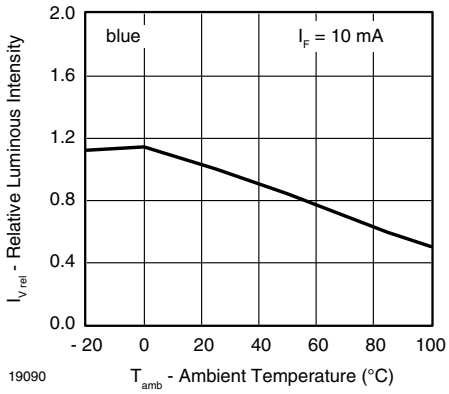


Fig. 10 - Relative Luminous Intensity vs. Ambient Temperature

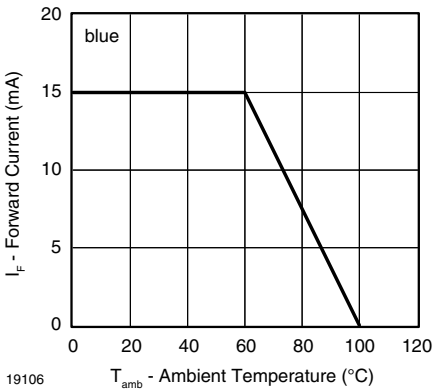


Fig. 8 - Forward Current vs. Ambient Temperature

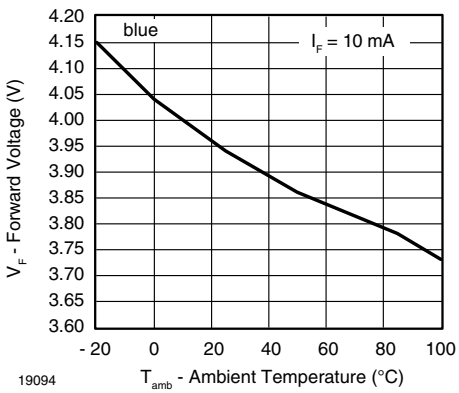


Fig. 11 - Forward Voltage vs. Ambient Temperature

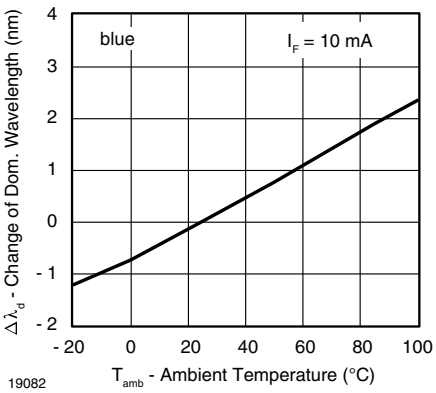


Fig. 9 - Change of Dominant Wavelength vs. Ambient Temperature

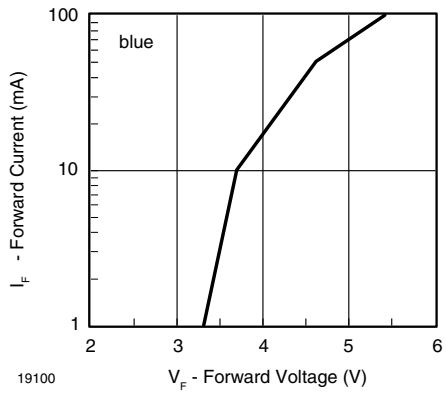


Fig. 12 - Forward Current vs. Forward Voltage

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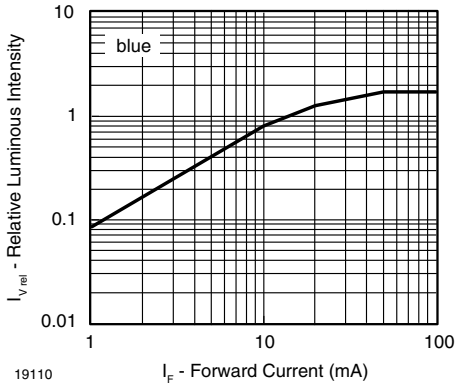


Fig. 13 - Relative Luminous Intensity vs. Forward Current

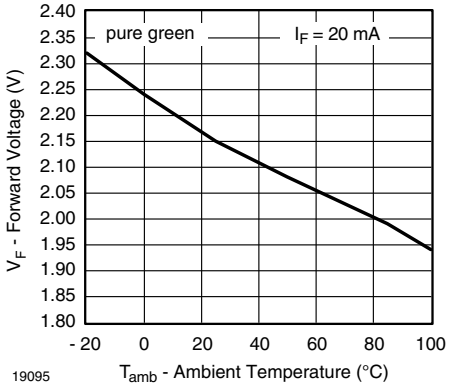


Fig. 16 - Forward Voltage vs. Ambient Temperature

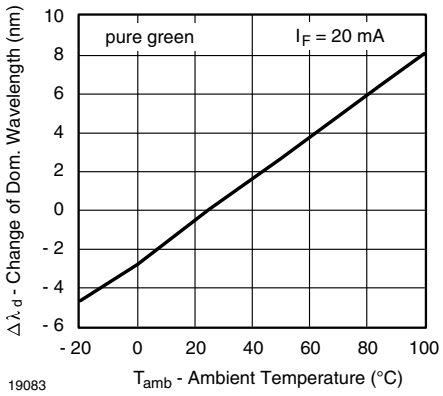


Fig. 14 - Change of Dominant Wavelength vs. Ambient Temperature

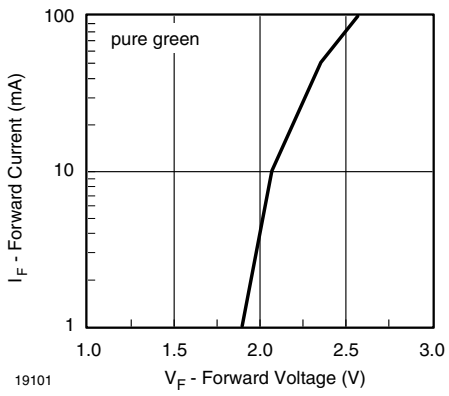


Fig. 17 - Forward Current vs. Forward Voltage

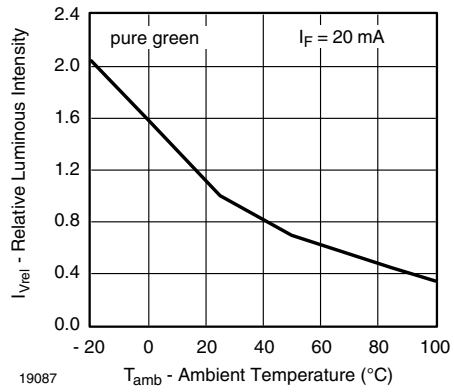


Fig. 15 - Relative Luminous Intensity vs. Ambient Temperature

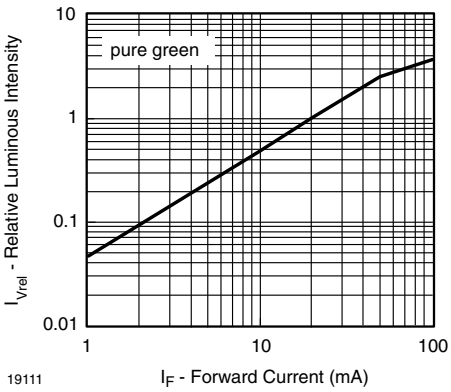


Fig. 18 - Relative Luminous Intensity vs. Forward Current

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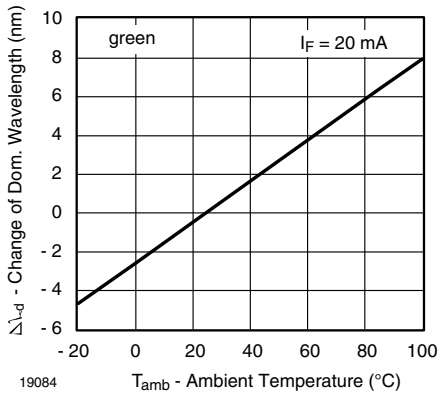


Fig. 19 - Change of Dominant Wavelength vs. Ambient Temperature

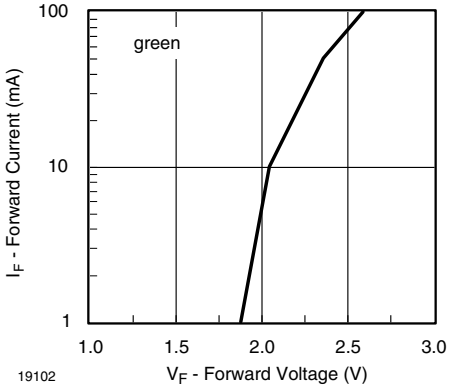


Fig. 22 - Forward Current vs. Forward Voltage

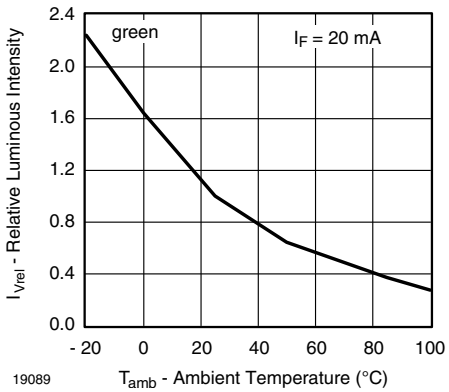


Fig. 20 - Relative Luminous Intensity vs. Ambient Temperature

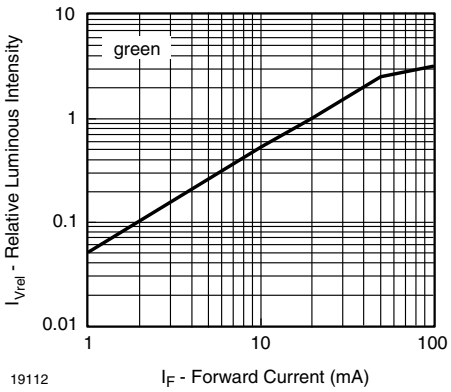


Fig. 23 - Relative Luminous Intensity vs. Forward Current

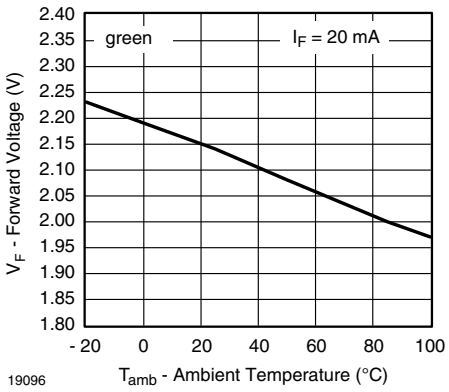


Fig. 21 - Forward Voltage vs. Ambient Temperature

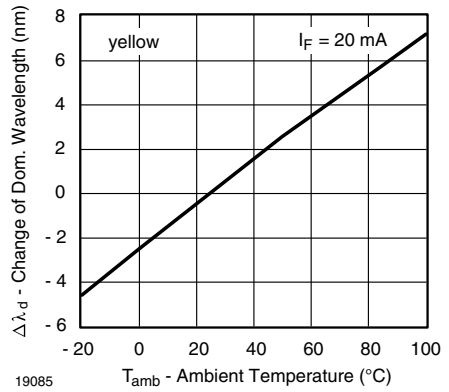


Fig. 24 - Change of Dominant Wavelength vs. Ambient Temperature

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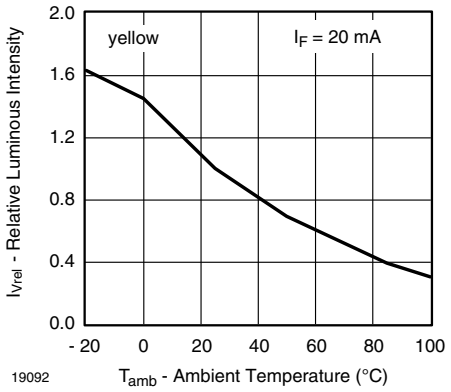


Fig. 25 - Relative Luminous Intensity vs. Ambient Temperature

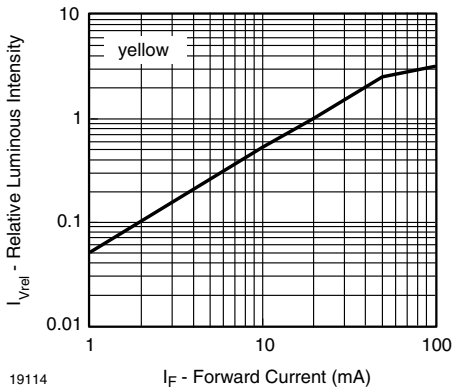


Fig. 28 - Relative Luminous Intensity vs. Forward Current

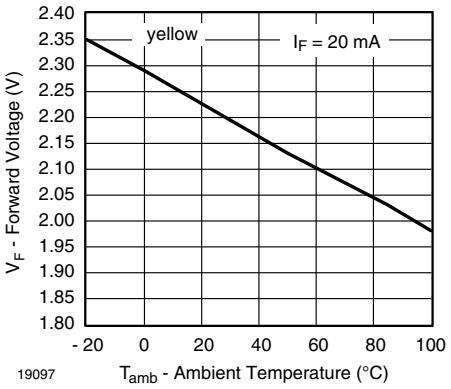


Fig. 26 - Forward Voltage vs. Ambient Temperature

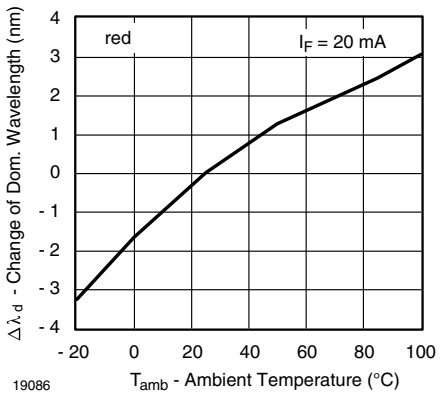


Fig. 29 - Change of Dominant Wavelength vs. Ambient Temperature

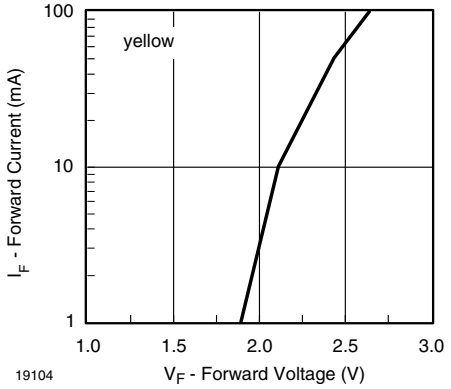


Fig. 27 - Forward Current vs. Forward Voltage

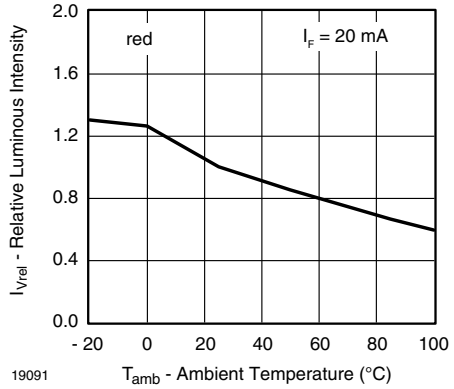


Fig. 30 - Relative Luminous Intensity vs. Ambient Temperature

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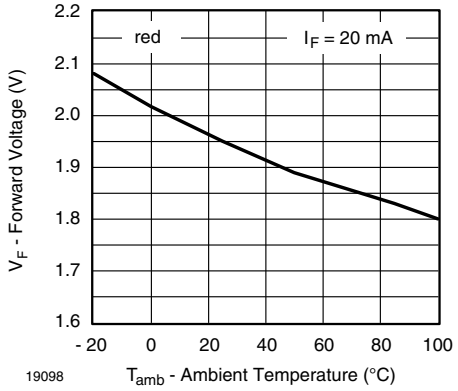


Fig. 31 - Forward Voltage vs. Ambient Temperature

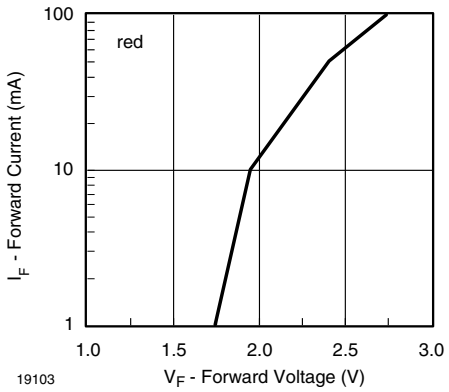


Fig. 32 - Forward Current vs. Forward Voltage

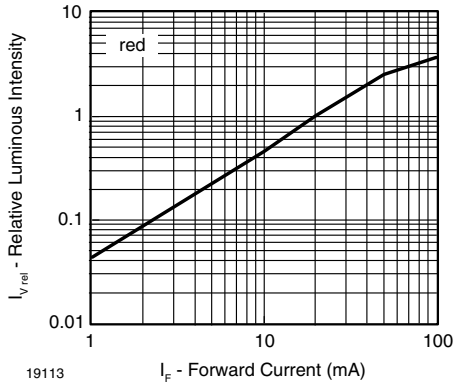
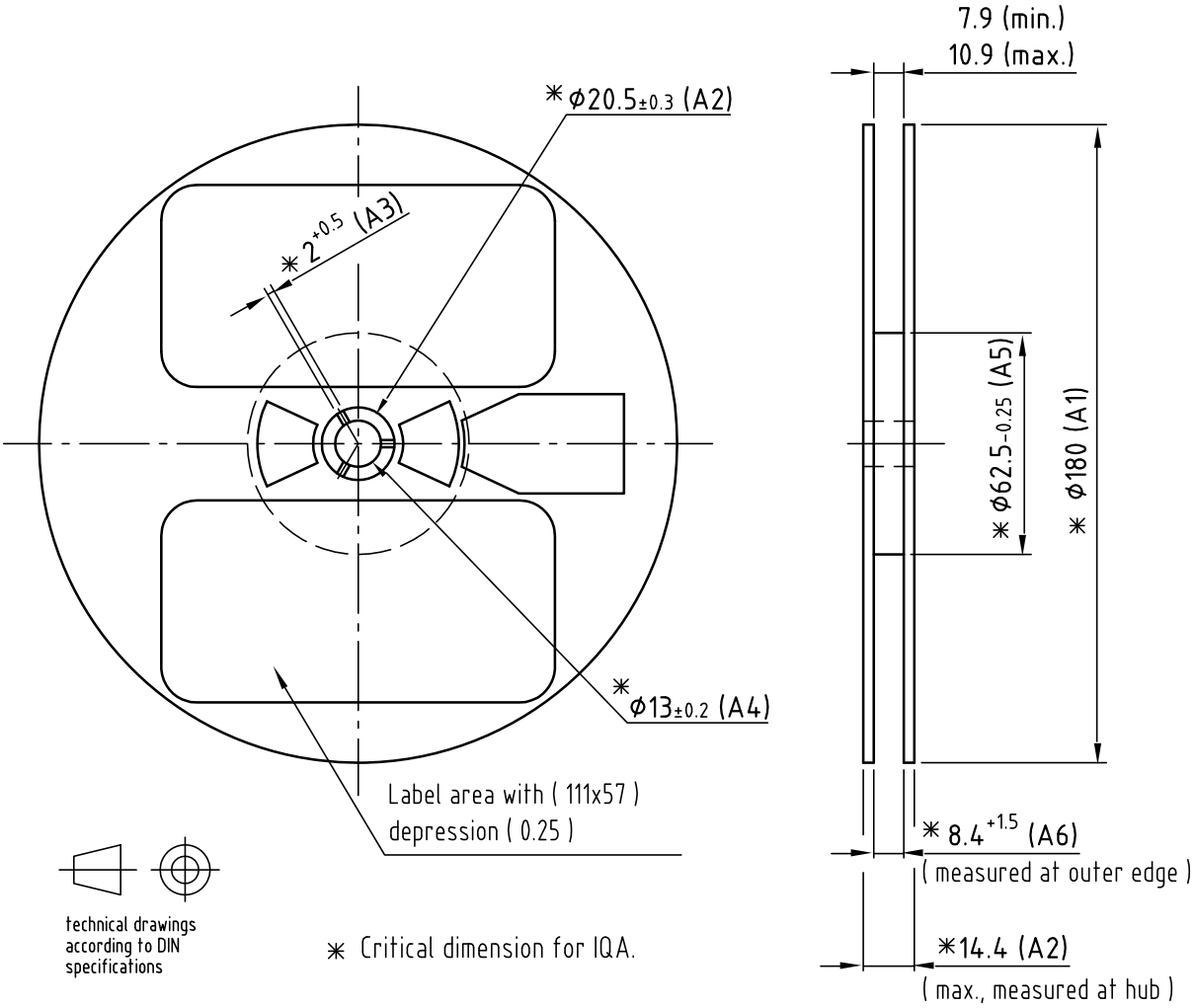


Fig. 33 - Relative Luminous Intensity vs. Forward Current

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REEL DIMENSIONS in millimeters



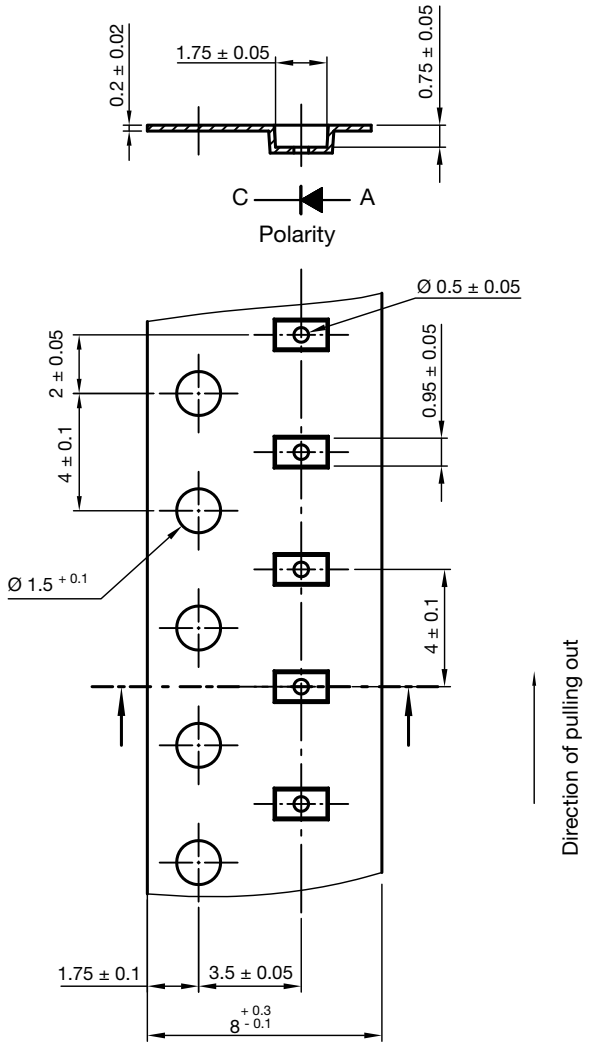
Drawing-No.: 9.800-5086.01-4
Issue: 1; 29.04.04

19043

Not indicated tolerances ±0.05
Material: black static dissipative

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TAPE DIMENSIONS in millimeters



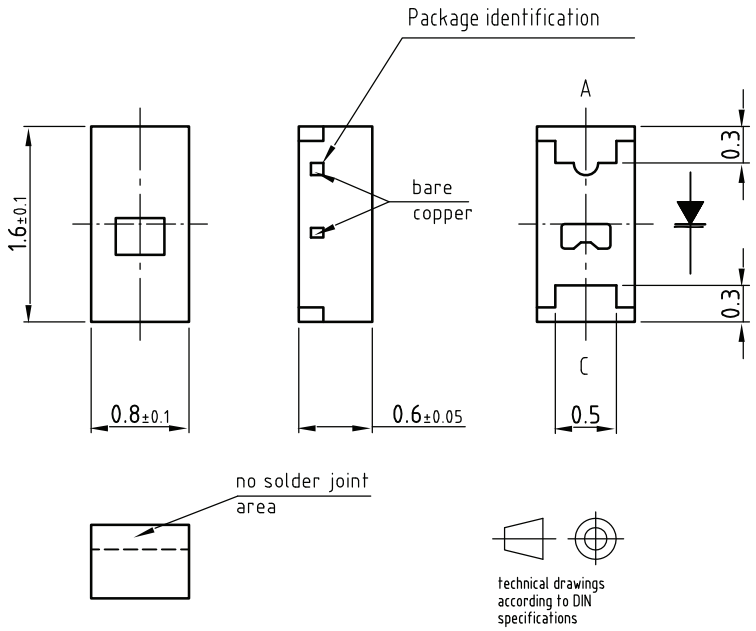
Technical drawings according to DIN specifications

Not indicated tolerances ± 0.05
Material: Conductive black PC

Drawing-No.: 9.700-5290.01-4
Issue: 3; 24.09.13

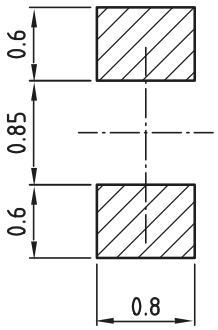
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PACKAGE DIMENSIONS in millimeters



Not indicated tolerances ±0.1

Recommended solder pad



Drawing-No.: 6.541-5056.01-4
Issue: 2; 04.05.05

19426

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SOLDERING PROFILE

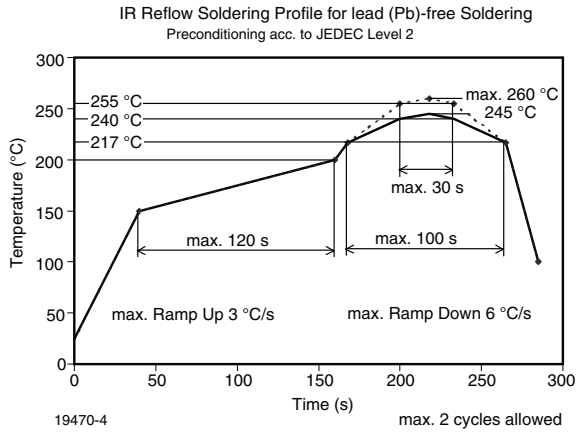
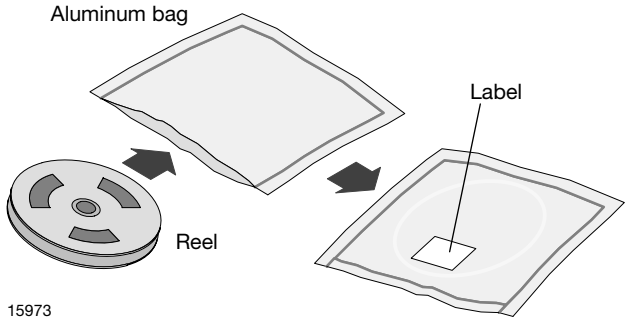


Fig. 34 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

DRY PACKING

The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.



FINAL PACKING

The sealed reel is packed into a cardboard box. A secondary cardboard box is used for shipping purposes.

RECOMMENDED METHOD OF STORAGE

Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

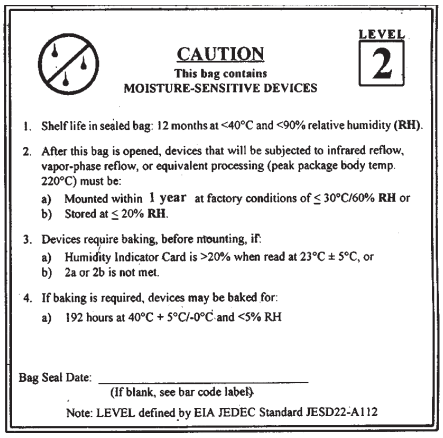
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

After more than 1 year under these conditions moisture content will be too high for reflow soldering.

In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

192 h at 40 °C + 5 °C / - 0 °C and < 5 % RH (dry air / nitrogen) or
96 h at 60 °C + 5 °C and < 5 % RH for all device containers or
24 h at 100 °C + 5 °C not suitable for reel or tubes.

An EIA JEDEC standard JESD22-A112 level 2a label is included on all dry bags.



Example of JESD22-A112 level 2 label

ESD PRECAUTION

Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electrostatic sensitive devices warning labels are on the packaging.

VISHAY SEMICONDUCTORS STANDARD BAR CODE LABELS

The Vishay Semiconductors standard bar code labels are printed at final packing areas. The labels are on each packing unit and contain Vishay Semiconductors specific data.

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SUD50P04-08-GE3 VS-50RIA60 WSL27265L000FEB ISOA200R11003JT SE20DLGHM3/I
WSL2512R0300FTB CRCW08051M00FKEA MSS2P3-M3/89A PR01000101603JR500 PTCCL05H280HTE
PTF5610K000BYEK PR03000204700JAC00 293D337X96R3D2T-E3 BRT13-H-X006 RCL12183R30FKEK
SQD50P08-28_GE3 1.5SMC91A-E3/57T SM8S43AHE3_A/I CCF5510K0FKE36 CRCW2512150RFKEGHP
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LTO150H470R0JTE3